

Date: Tuesday, 10/06/2008 8:56:40 AM
 User: Julie Lecocq

Process Sheet

Customer : CU-DAR001 Dart Helicopters Services Drawing Name : 212/205 HIGH AFT X-TUBE ASSEMBLY
 Job Number : 39747
 Estimate Number : 13218
 P.O. Number : Part Number : D212664201TRN
 This Issue : 10/06/2008 S.O. No. : Drawing Number : D212-664-241 REV C
 Prsht Rev. : NC Project Number : N/A
 First Issue : / / Type : CROSSTUBES Drawing Revision : C
 Previous Run : 39746 Material :
 Written By : Due Date : 20/06/2008 Qty: 1 Um: Each
 Checked & Approved By : JUL 08.06.10
 Comment : Est Rev:A 08-03-06 new issue DD verified by:ec
 Est Rev B 08.04.02 Removed polish EC verified DD

Additional Product

Job Number:



Seq. #: Machine Or Operation: Description :

1.0 D6006129 Crosstube Material



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Pick:

Qty Part number Description Batch

1 D6006-129 Crosstube 826550

Check OD = 3.250"; ID = 2.220"

A.M 08.06.12 ①

2.0 MORI SEIKI MORI SEIKI CNC LATHE LARGE



(P10) →

Comment: MORI SEIKI CNC LATHE LARGE

1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA114

2-Turn first side as per Folio FA114

3- File transition lines smooth.

A.M 08.06.12 ①

3.0 QC1 INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

A.M 08.06.12 ①

4.0 MORI SEIKI MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA114

2- File transition lines smooth.

3-Remove sand and plugs

A.M 08.06.12 ①

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D212-664-201TRN PAR #: N/A Fault Category: Prod / v tube NCR: Yes No DQA: D Date: 08/06/17
 QA: N/C Closed: D Date: 08/06/17

NCR: <u>39747</u>		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
<u>8/6/12</u>	<u>#20</u>	tube was cut 150 short by 124.300" instead of 124.360" R.C. operator error, went in the wrong direction on his cut.	<u>CP</u> 08.06.13 per QSI 042	ADJUST TAPER TO THAT QUEFS ARE SHORTER BY 0.030" TUBE ACCEPTABLE. MARGINS STILL POSITIVE. EFFECTIVE OD REDUCED BY 0.001. REF ATTACHED DIM SHEET.	<u>CP</u> 08.06.13 per 08.06.12	<u>CP</u> 08.06.13 per QSI 042	<u>CP</u> 08.06.13 per QSI 042	<u>CP</u> 08/06/12
								<u>CP</u> 08/06/12

NOTE: Date & initial all entries

Date: Tuesday, 10/06/2008 8:56:41 AM
User: Julie Lecoq

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 212/205 HIGH AFT X-TUBE ASSEMBLY

Job Number: 39747

Part Number: D212664201TRN

Job Number:



Seq. #:

Machine Or Operation:

Description :

5.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

A.M. 08.06.13 ①

6.0

QC8

SECOND CHECK



Comment: SECOND CHECK

08/06/13 ②

7.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1 within 24 hours of machining

AWM
8-6-13

8.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

DD 8-6-13

9.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Identify and stock in kanban rack

Location:

X-TUBE CELL

AWM
8-6-13

10.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

08/06/13

Job Completion



W 08.06.13

DART AEROSPACE LTD	Work Order: 39747
Description: Crosstube Assembly (205/212 High Aft)	Part Number: D212-664-241
Inspection Dwg: D212-664-241 Rev: C	Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article
 ☐ Prototype

Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	0.200	+/-0.010	0.200	✓		
	R0.063	+/-0.010	R0.063	✓		
	2.990	+0.005/-0.000	2.995	✓		
	5.237	+/-0.030	5.237	✓		
	2.600	+0.005/-0.000	2.605	✓		
	2.686	+0.005/-0.000	2.691	✓		
	2.770	+0.005/-0.000	2.775	✓		
	2.854	+0.005/-0.000	2.859	✓		
	2.938	+0.005/-0.000	2.943	✓		
	3.021	+0.005/-0.000	3.026	✓		
	3.133	+0.005/-0.000	3.137	✓		
	3.179	+0.005/-0.000	3.184	✓		
SIDE B	0.200	+/-0.010	0.200	✓		
	R0.063	+/-0.010	R0.063	✓		
	2.990	+0.005/-0.000	2.995	✓		
	5.237	+/-0.030	5.237	✓		
	2.600	+0.005/-0.000	2.605	✓		
	2.686	+0.005/-0.000	2.691	✓		
	2.770	+0.005/-0.000	2.775	✓		
	2.854	+0.005/-0.000	2.859	✓		
	2.938	+0.005/-0.000	2.941	✓		
	3.021	+0.005/-0.000	3.026	✓		
	3.133	+0.005/-0.000	3.137	✓		
	3.179	+0.005/-0.000	3.182	✓		
	124.36	+/-0.020	124.390	✗	X	Re See P/B 2nd Page
						800661/3

Measured by: a.m	Audited by: S	Prototype Approval:	N/A
Date: 08.06.12	Date: 08/06/13	Date:	N/A

Rev	Date	Change	Revised by	Approved
A	05.04.27	New Issue (P/O D412-664-201)	KJ/JLM	
B	06.03.09	Tolerance for 5.237 was +/-0.001	KJ/JLM	
C	07.05.08	Dwg Rev. updated	KJ/JLM	



DESIGN <i>PH</i>	DRAWN BY <i>PH</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>J</i>	APPROVED <i>[Signature]</i>	DRAWING NO. D212-664-241	REV. C SHEET 1 OF 3
DATE 07.03.08		TITLE CROSSTUBE ASS'Y (205/212 HI AFT) NTS	
A	00.12.12	NEW ISSUE	
B	05.02.04	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	
C	07.03.08	REMOVE -1009 ABRASION STRIP; ADD MAGNOBOND 6398, CUSHION, REVERSE CLAMPS	

RELEASED
07.04.24
PER E.C.N. 005

Qty	Part Number	Description
X	D212-664-241	CROSSTUBE ASSEMBLY (205/212 HIGH AFT)
1	D6006-129	CROSSTUBE
2	D2940-1	SUPPORT
4	D3595-063-530	RUBBER CUSHION
4	MS21920-28	CLAMP (OR MS21920-30)
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947- 100, TYPE II, CLASS 2 ADHESIVE)

GENERAL NOTES:

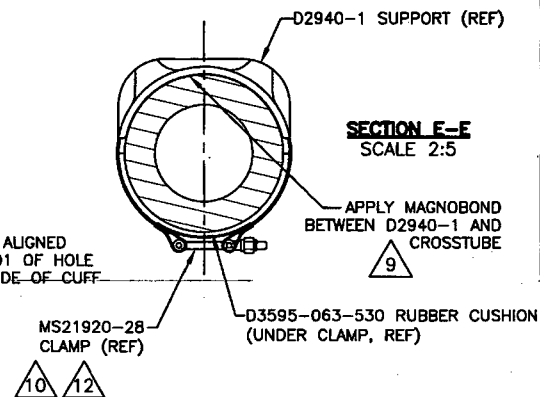
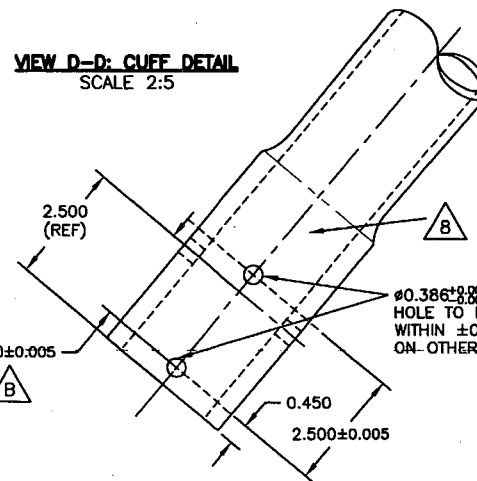
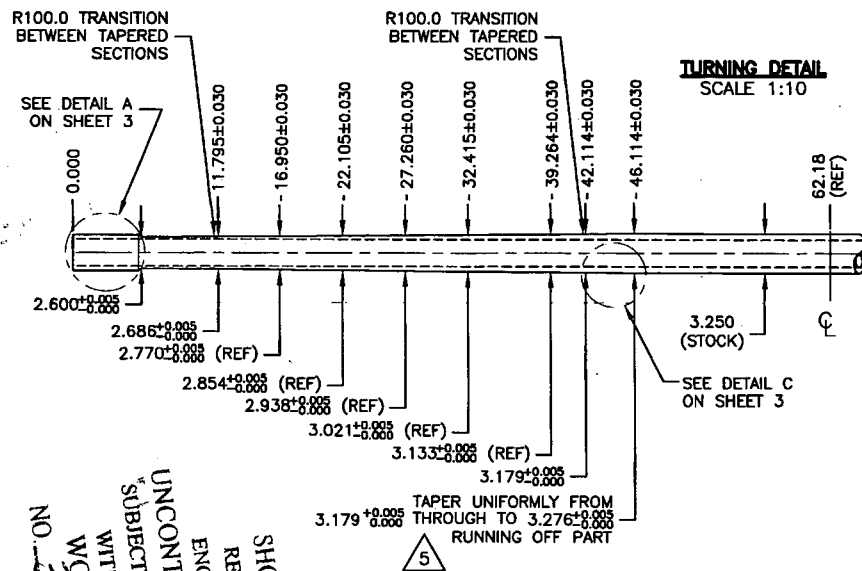
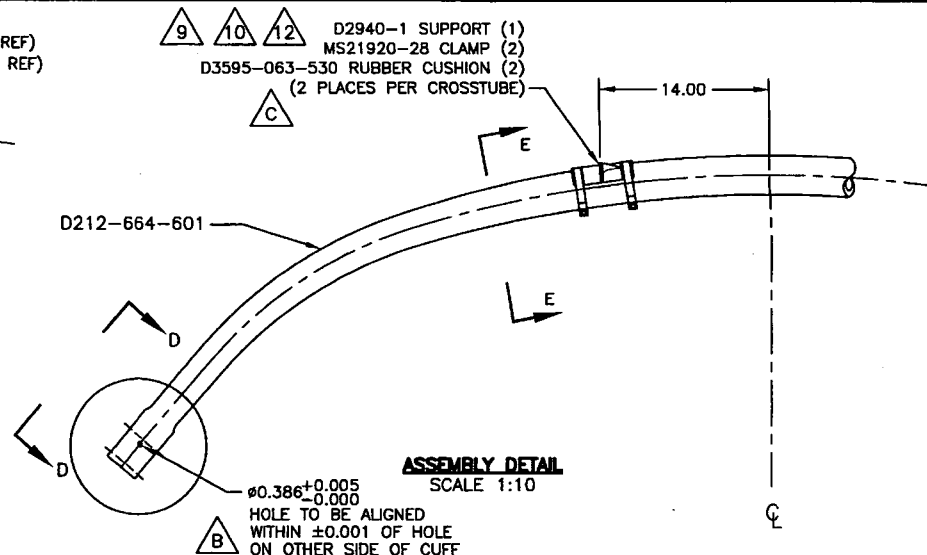
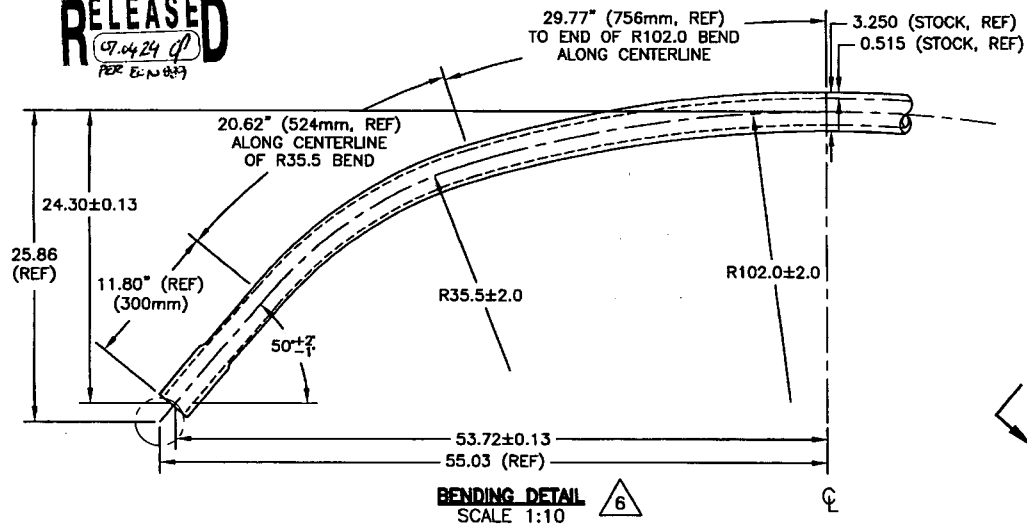
- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- 2) MATERIAL: MANUFACTURED FROM D6006-129
FINISHED LENGTH = 124.36±0.020
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 5 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2940-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 10) INSTALL MS21920-28 CLAMPS WITH D3595-063-530 RUBBER CUSHIONS TO SECURE D2940-1 SUPPORT ON TOP SIDE OF CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT
NOTE: MS21920-30 CLAMPS CAN BE USED TO ACCOMMODATE VARYING DIAMETERS. ENSURE THERE IS A MINIMUM OF 1.5 THREADS IN SAFETY ON THE NUTS.
- 11) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 12) TORQUE CLAMPS 80 TO 100 IN-LB.

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RELEASED
07.04.24 (1)
PER E-N 013



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07.03.08

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PH
APPROVED
DATE

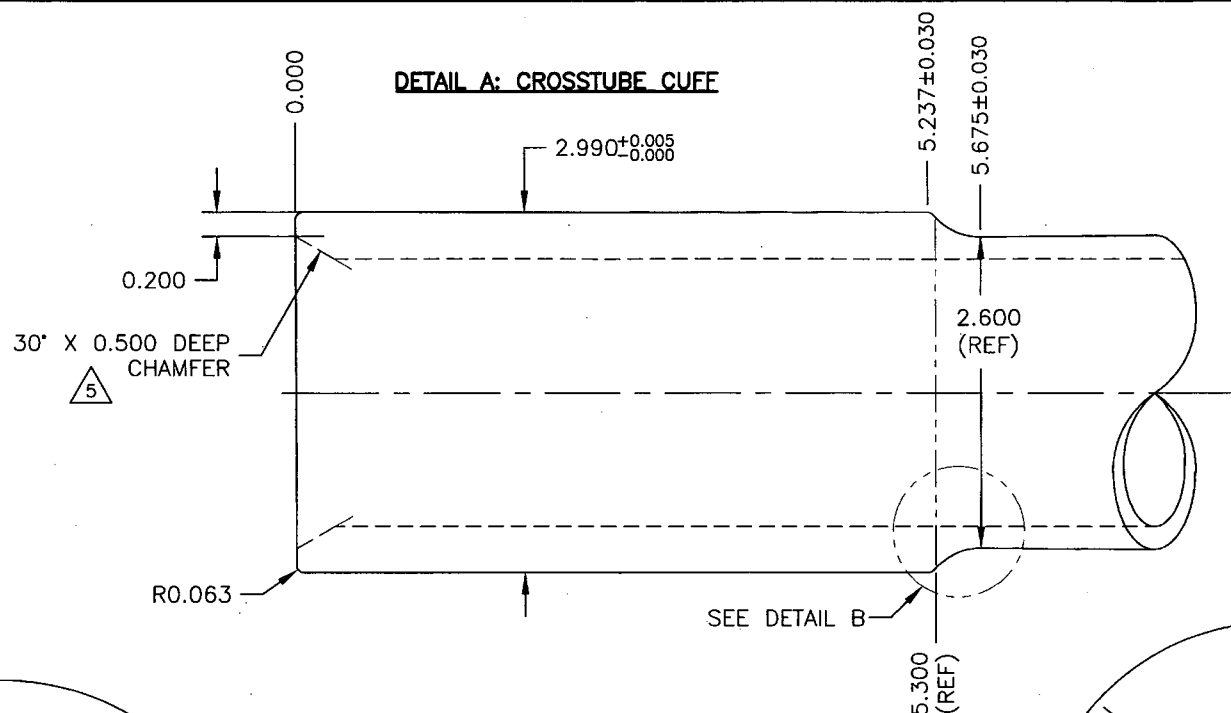
DART DART AEROSPACE LTD.
WIMBORNE, DORSET, ENGLAND

DRAWING NO.
D212-664-241
TITLE
CROSSTUBE ASS'Y (205/212 HI AFT)
REV. C
SHEET 2 OF 3
SCALE
1:10

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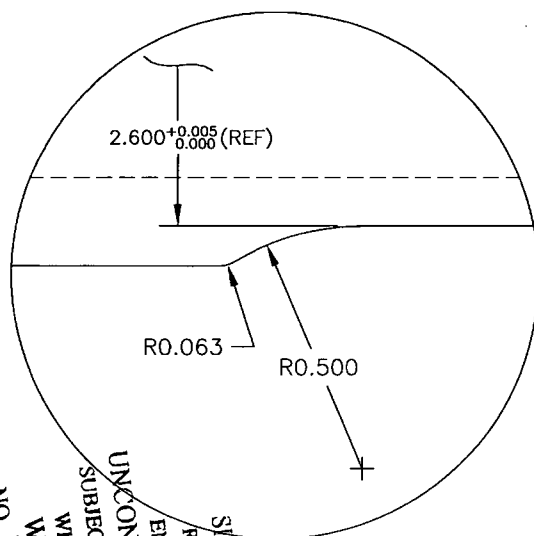
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DETAIL A: CROSSTUBE CUFF

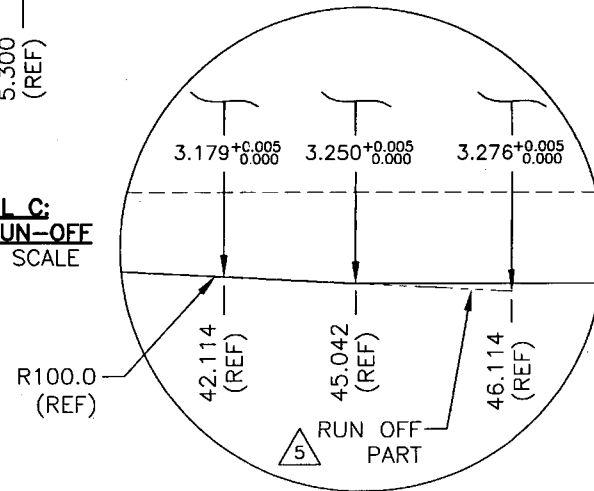


SEE DETAIL B

**DETAIL B: CUFF
TRANSITION
SCALE 4:1**



**DETAIL C:
TAPER RUN-OFF
NOT TO SCALE**



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DATE		07.03.08		DRAWING NO.	REV. C
				D212-664-241	SHEET 3 OF 3
				TITLE	SCALE
				CROSSTUBE ASS'Y (205/212 HI AFT)	1:1

EXCERPT FROM
SR-D212-664-1 Rev A

SECTION	Cross tube	Damage Tolerance	O.D. (in)	I.D. (in)	Area (in ²)	Inertia (in ⁴)
A-A	Bell Aft	0.000	3.250	2.220	4.425	4.284
	Bell Aft w/ dam. tol.	0.005			4.415	4.258
	Dart Aft	0.000	3.249	2.220	4.420	4.277
	Dart Aft w/ dam. tol.	0.015			4.278	4.053
B-B	Bell Aft	0.000	3.184	2.220	4.091	3.853
	Bell Aft w/ dam. tol.	0.005			4.081	3.827
	Dart Aft	0.000	3.178	2.220	4.062	3.815
	Dart Aft w/ dam. tol.	0.015			3.862	3.619
C-C	Bell Aft	0.000	3.027	2.220	3.326	2.929
	Bell Aft w/ dam. tol.	0.005			3.316	2.906
	Dart Aft	0.000	3.020	2.220	3.292	2.891
	Dart Aft w/ dam. tol.	0.015			3.093	2.703
D-D	Bell Aft	0.000	2.944	2.220	2.936	2.495
	Bell Aft w/ dam. tol.	0.005			2.926	2.473
	Dart Aft	0.000	2.937	2.220	2.904	2.460
	Dart Aft w/ dam. tol.	0.015			2.705	2.308
E-E	Bell Aft	0.000	2.776	2.220	2.182	1.723
	Bell Aft w/ dam. tol.	0.012			2.158	1.677
	Dart Aft	0.000	2.769	2.220	2.151	1.693
	Dart Aft w/ dam. tol.	0.015			1.952	1.516
F-F	Bell Aft	0.000	2.693	2.220	1.825	1.389
	Bell Aft w/ dam. tol.	0.012			1.801	1.346
	Dart Aft	0.000	2.686	2.220	1.796	1.363
	Dart Aft w/ dam. tol.	0.015			1.596	1.189
G-G	Bell Aft	0.000	2.593	2.220	1.410	1.027
	Bell Aft w/ dam. tol.	0.012			1.386	0.986
	Dart Aft	0.000	2.599	2.220	1.434	1.047
	Dart Aft w/ dam. tol.	0.015			1.235	0.877
H-H	Bell Aft	0.000	3.000	2.220	3.198	2.784
	Bell Aft w/ dam. tol.	0.030			3.138	2.649
	Dart Aft	0.000	2.990	2.220	3.151	2.731
	Dart Aft w/ dam. tol.	0.038			2.906	2.441

DART OD
REDUCED BY
0.001"

UP 08.06.13

SECTION **	Cross tube	Bending Ultimate (lb*in)	Bending Yield (lb*in)	Tension Ultimate (lb)	Tension Yield (lb)	Shear Ultimate (lb)
A-A	Bell aft w/ DT	172932	146731	291391	247241	185430
	Dart aft w/ DT	192122	164676	329372	282319	175380
	Margin of Safety	0.11	0.12	0.13	0.14	-0.05
B-B	Bell aft w/ DT	158673	134631	269379	228564	171423
	Dart aft w/ DT	175382	150327	297403	254917	158357
	Margin of Safety	0.11	0.12	0.10	0.12	-0.08
C-C	Bell aft w/ DT	126722	107522	218832	185676	139257
	Dart aft w/ DT	137818	118130	238180	204154	126823
	Margin of Safety	0.09	0.10	0.09	0.10	-0.09
D-D	Bell aft w/ DT	110902	94099	193142	163878	122909
	Dart aft w/ DT	121020	103731	208279	178525	110902
	Margin of Safety	0.09	0.10	0.08	0.09	-0.10
E-E	Bell aft w/ DT	79720	67641	142406	120829	90622
	Dart aft w/ DT	84323	72277	150306	128834	80033
	Margin of Safety	0.06	0.07	0.06	0.07	-0.12
F-F	Bell aft w/ DT	65973	55977	118876	100864	75648
	Dart aft w/ DT	68160	58422	122925	105364	65454
	Margin of Safety	0.03	0.04	0.03	0.04	-0.13
G-G	Bell aft w/ DT	50218	42609	91475	77615	58211
	Dart aft w/ DT	51963	44540	95119	81530	50648
	Margin of Safety	0.03	0.05	0.04	0.05	-0.13
H-H	Bell fwd w/ DT	116546	98888	207097	175718	131789
	Dart fwd w/ DT	125742	107779	223734	191772	119131
	Margin of Safety	0.08	0.09	0.08	0.09	-0.10

MARGINS
STILL POSITIVE

CP
08.06.13